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CLAIMS

[Claim(s)]

[Claim 1] It is the dot recording device which records a dot on the surface of print media using the dot recording head in which two or more dot formative elements which carry out the regurgitation of the ink droplet were prepared. The horizontal-scanning mechanical component which drives said dot recording head to said print media, and performs horizontal scanning. The head mechanical component in which drive at least the part of said two or more dot formative elements in the midst of said horizontal scanning, and a dot is made to form. The vertical-scanning mechanical component which drives said print media in the direction of said horizontal scanning, and the direction at which it crosses, and performs vertical scanning. It is the dot recording device formed in the location at which said detection section does not cross the locus of the ink droplet breathed out from said dot formative element in the case of said horizontal scanning by having the detection section for detecting the existence of said print media in a predetermined detection point, and a control section for controlling said each part.

[Claim 2] It is a dot recording device according to claim 1. Said control section The function which starts said vertical scanning of said print media from the condition which does not have said print media in said detection point. When said detection section detects said print media, in the function to stop said vertical scanning of said print media about the direction of said vertical scanning in a predetermined vertical-scanning location, and the condition that said print media is in said predetermined vertical-scanning location A dot recording device equipped with the function which starts said horizontal scanning, making an ink droplet breathe out from said dot formative element.

[Claim 3] It is the dot recording device which has the light sensing portion which is a dot recording device according to claim 1, and receives the light-emitting part with which said detection section injects light towards said predetermined detection point, and the reflected light in which said light reflected in said print media.

[Claim 4] It is the dot recording device formed so that it may be a dot recording device according to claim 1 and said detection section may be driven by said dot recording head and one in the case of said horizontal scanning.

[Claim 5] It is the dot recording device with which it is a dot recording device according to claim 4, and the location of said detection section is set as the location near the dot formative element located in the edge of the downstream of the direction of said vertical scanning among said dot formative elements used for printing about the direction of said vertical scanning.

[Claim 6] So that it may be a dot recording device according to claim 1 and said dot formative element may be further faced in a part of course [at least] of said horizontal scanning It is extended and prepared towards said horizontal scanning, and has the platen which supports said print media. Said platen in the location which faces the dot formative element located in the edge of the downstream of the direction of said vertical scanning among said two or more dot formative elements at least it is the dot recording device which is a position within the limits in which it has the downstream slot extended and prepared towards said horizontal scanning, and said detection point is in opening of said downstream slot, and said dot formative element exists about the direction of said vertical scanning.

[Claim 7] It is a dot recording device according to claim 6. Said platen Furthermore, it is prepared in the range which includes the impact range of the ink droplet from said dot formative element at least about the direction of said vertical scanning. It has a side slot connected to said downstream slot. Said dot recording device The predetermined horizontal-scanning location about the direction of said horizontal scanning is equipped with the guide section for positioning said print media in the case of said vertical scanning. Furthermore, said predetermined horizontal-scanning location Said print media is located in the stroke of said horizontal scanning of said dot recording head about the direction of said horizontal scanning. It is the dot recording device said whose detection point one side edge section of the direction of said horizontal scanning of said print media is the location located on opening of said side slot, and is the position of the connection part of said side slot and said downstream slot.

[Claim 8] It is a dot recording device according to claim 7. Said side slot The 1st side slot, the 2nd side slot, and one pair of ** are prepared. Said 1st side slot and said 2nd side slot The dot recording device formed so that one side edge section of the direction of said horizontal scanning of said print media may be located on said 1st side slot and the side edge section of another side may be located on said 2nd side slot, when said print media is in said predetermined horizontal-scanning location.

[Claim 9] The dot recording head in which two or more dot formative elements which carry out the regurgitation of the ink droplet were prepared. The detection section for being prepared in the location at which the locus of the ink droplet of said dot formative element in the case of horizontal scanning is not crossed, and detecting the existence of said print media in a predetermined detection point. It is the dot record approach which used the preparation and the dot recording device which records a dot on the front face of said print media. (a) The process which starts vertical scanning which is a scan which drives said record medium in the direction of said horizontal scanning, and the direction at which it crosses from the condition that said print media cannot be found in said detection point. (b) when said detection section detects said print media, in the process which stops said vertical scanning of said print media about the direction of said vertical scanning in a predetermined vertical-scanning location, and the condition that the (c) aforementioned print media is in said predetermined vertical-scanning location The dot record approach characterized by having the process which starts said horizontal scanning, making an ink droplet breathe out from said dot formative element.

[Claim 10] The dot recording head in which two or more dot formative elements which carry out the regurgitation of the ink droplet were prepared. The detection section for being prepared in the location at which the locus of the ink droplet of said dot formative element in the case of horizontal scanning is not crossed, and detecting the existence of said print media in a predetermined detection point. To a computer equipped with the dot recording device which **** and records a dot on the front face of said print media It is the record medium which recorded the computer program for making a dot record and in which computer reading is possible. The function which starts vertical scanning which is a scan which drives said record medium in the direction of said horizontal scanning, and the direction at which it crosses from the condition that said print media cannot be found in said detection point. When said detection section detects said print media, in the function to stop said vertical scanning of said print media about the direction of said vertical scanning in a predetermined vertical-scanning location, and the condition that said print media is in said predetermined vertical-scanning location The record medium which is recording the computer program for making said computer realize the function which starts said horizontal scanning, making an ink droplet breathe out from said dot formative element and in which computer reading is possible.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the technique which prints by positioning a print sheet correctly especially about the technique which records a dot on the surface of a record medium using a dot recording head.

[0002]

[Description of the Prior Art] In recent years, the printer which carries out the regularization of the ink from the nozzle of the print head has spread widely as an output unit of a computer. Drawing 15 is the side elevation showing the circumference of the print head of the conventional printer. A print sheet P is sent in the direction of an arrow head A, and is suspended by the position by the upstream paper feed rollers 25p and 25q arranged on the upstream of platen 26o, and the downstream paper feed rollers 25r and 25s arranged on the lower stream of a river of platen 26o. And a print sheet P is supported so that head 28o may be faced on platen 26o. Then, a print sheet is turned little by little in the direction of an arrow head A from the print head with delivery at the position on platen 26o, and many ink droplets Ip are breathed out. Those ink droplets Ip reach the print sheet P on platen 26o, and an image is recorded on a print sheet.

[0003]

[Problem(s) to be Solved by the Invention] In the above printers, as shown in drawing 15, when the print sheet has shifted from the assumption location shown with a broken line, an image is not formed in the location assumed on the print sheet. Moreover, the image which was due to be formed near the edge of a print sheet may overflow a print sheet. In such a case, as shown in drawing 15, from the print sheet edge which an ink droplet should carry out this arrival cartridge, the print sheet which shifts, reaches the target on a platen and passes through a platen top after that will become dirty.

[0004] This invention is made in order to solve the above-mentioned technical problem in the conventional technique, and it aims at offering the technique which prints by positioning a print sheet correctly.

[0005]

[The means for solving a technical problem, and its operation and effectiveness] In order to solve a part of above-mentioned technical problem [at least], the following configurations were adopted in this invention. The dot recording device of this invention is a dot recording device which records a dot on the surface of print media using the dot recording head in which two or more dot formative elements which carry out the regularization of the ink droplet were prepared. And it has the head mechanical component in which drive at least the part of the dot formative elements of plurality [midst / of horizontal scanning / the horizontal-scanning mechanical component which drives a dot recording head to print media, and performs horizontal scanning, and], and a dot is made to form, the vertical-scanning mechanical component which drives print media in the direction of horizontal scanning, and the direction at which it crosses, and performs a predetermined detection point, and a control section for controlling each part. And the detection section is prepared in the location at which the locus of the ink droplet breathed out from a dot

formative element in the case of horizontal scanning is not crossed. By detecting print media by such mode, then the detection section, print media can be positioned correctly, a dot can be recorded and an image can be formed on a record medium.

[0006] In addition, in the above-mentioned dot recording device, it is desirable to perform the following printings. That is, vertical scanning of print media is started from the condition which does not have print media in a detection point. And when the detection section detects print media, vertical scanning of print media is stopped about the direction of vertical scanning in a predetermined vertical-scanning location. Then, horizontal scanning is started, print media making an ink droplet breathe out from a dot formative element in the condition of being in a predetermined vertical-scanning location. According to such printing, print media can be positioned on the basis of whether the point of print media arrived at the predetermined detection point. Therefore, print media can be correctly positioned about the direction of vertical scanning.

[0007] Moreover, as for the detection section, it is desirable to have the light-emitting part which injects light towards a predetermined detection point, and the light sensing portion which receives the reflected light which light reflected in print media. If it does in this way, print media can be detected without contacting print media, and it will not become obstructive in the case of record of the dot to print media.

[0008] In addition, as for the detection section, it is desirable to be prepared so that it may drive by the dot recording head and one in the case of horizontal scanning. A dot recording head and the detection section do not interfere in such a mode, then horizontal scanning.

[0009] Moreover, as for the location of the detection section, about the direction of vertical scanning, it is desirable to be set as the location near the dot formative element located in the edge of the downstream of the direction of vertical scanning among the dot formative elements used for printing. [near such a mode, then the dot formative element which prints the point of print media], the existence of print media can be detected and print media can be positioned. Therefore, print media can be correctly positioned to the dot formative element which prints the point of print media.

[0010] In addition, as for a dot recording device, it is desirable to have the platen which is extended and prepared towards horizontal scanning and supports print media so that a dot formative element may be faced in a part of course [at least] of horizontal scanning. And considering as the following configurations is desirable. That is, the platen shall have the downstream slot extended and established in the location which faces the dot formative element located in the edge of the downstream of the direction of vertical scanning among two or more dot formative elements at least, towards horizontal scanning. And let the detection point of the detection section be a position within the limits in which it is in opening of a downstream slot, and a dot formative element exists about the direction of vertical scanning. Such a mode, then the tip of a record medium can detect being located in opening of a downstream slot, and can start record of the dot near the tip of the record medium by the dot formative element.

[0011] Moreover, as for a platen, it is desirable for it to be prepared in the range which includes the impact range of the ink droplet from a dot formative element at least, to consider as the mode which has a side slot connected to the downstream slot, and to consider as the still more nearly following configurations about the direction of vertical scanning, further. That is, a dot recording device equips the predetermined horizontal-scanning location about the direction of horizontal scanning with the guide section for positioning print media further in the case of vertical scanning. And print media is located in the stroke of horizontal scanning of a dot recording head about the direction of horizontal scanning, and one side edge section of the direction of horizontal scanning of print media makes the predetermined horizontal-scanning location where the guide section positions print media the location located on opening of a side slot. And let the detection point of the detection section be the position of the connection part of a side slot and a downstream slot. It can detect that such a mode, then the tip of a record medium are located in opening of a downstream slot, and the side edge section is located on opening of a side slot, and record of the dot to a record medium can be started.

[0012] In addition, it is desirable that the 1st side slot, the 2nd side slot, and ** prepare one pair

of side slot. And when print media is in a predetermined horizontal-scanning location, as for the 1st side slot and the 2nd side slot, it is desirable to prepare so that one side edge section of the direction of horizontal scanning of print media may be located on the 1st side slot and the side edge section of another side may be located on the 2nd side slot. When it detects that such a mode, then the tip of a record medium are located in opening of a downstream slot, and one side edge section is located on opening of the 1st side slot, the side edge section of another side will be located on opening of the 2nd side slot and ** — arrangement [like] can be checked and record of the dot to a record medium can be started.

[0013] In addition, this invention can be realized in various modes as shown below.

- (1) A dot recording device, a print control unit, an airline printer.
- (2) The dot record approach, the printing control approach, the printing approach.
- (3) The computer program for realizing above-mentioned equipment and an above-mentioned approach.
- (4) The record medium which recorded the computer program for realizing above-mentioned equipment and an above-mentioned approach.
- (5) The data signal embodied in the subcarrier including the computer program for realizing above-mentioned equipment and an above-mentioned approach.

[0014]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained in order of the following based on an example.

A. outline [of an operation gestalt] — B. equipment whole configuration: — arrangement [of C. print sheet]: — D. upper limit processing: — printing [of E. right-and-left side edge section]: — F. lower limit processing: — G. modification: [0015] A. The outline of an operation gestalt : drawing 1 is the top view showing the structure of the platen circumference of the ink jet printer in the gestalt of operation of this invention simple. In drawing 1, a print sheet P is caudad turned from the upper part, and vertical-scanning delivery is carried out to the sense of an arrow head SS. In that case, a print sheet P is guided with Guides 29a and 29b, and vertical-scanning delivery is carried out so that the both-sides edges Pa and Pb may be located on left-hand side slot 26a of a platen 26, and right-hand side slot 26b. On the other hand, in case vertical-

scanning delivery of the print sheet P is carried out towards a platen 26 top, the carriage 31 of the print head is allotted to the location shown with a broken line. This carriage 31 equips with the photograph reflector 33 the field which faces a platen 26. This photograph reflector 33 is formed on carriage 31 in the upstream (the reverse direction of an arrow head SS) location more slightly than the nozzle of the edge of the downstream of the direction of vertical scanning. This photograph reflector 33 detects whether a print sheet P exists in the predetermined point DP of 26a of connection parts of left-hand side slot 26a and downstream slot 26r.

[0016] It will be stopped by vertical-scanning delivery of a print sheet P, if vertical-scanning delivery of the print sheet P is carried out in the direction of an arrow head SS and the front end is detected by the photograph reflector 33. And printing of the upper limit section Pf (in drawing 1, it becomes a lower limit.) of a print sheet P is started by some nozzles which are on downstream slot 26r among the nozzles on the print head. Since the nozzle on the print head is prepared even in the point of the direction of an arrow head SS rather than the upper limit section Pf of a print sheet P, it can form an image, without making a margin to the upper limit of a print sheet P. Moreover, since the nozzle used for printing is a nozzle on downstream slot 26r, also when an ink droplet shifts from a print sheet P, an ink droplet reaches the target in downstream slot 26r, and does not reach center-section 26c of a platen 26. Therefore, the inferior surface of tongue of a print sheet P is not soiled by the ink droplet which reached center-section 26c of a platen 26. Moreover, it prints similarly about the right-and-left both-sides edge of a print sheet P by the nozzle located on left-hand side slot 26a and right-hand side slot 26b in the case of horizontal scanning. Therefore, a right-and-left both-sides edge can be printed without a margin, without soiling center-section 26c of a platen 26.

[0017] B. The configuration of equipment : drawing 2 is the block diagram showing the configuration of the software of this airline printer. By computer 90, the application program 95 is operating under a predetermined operating system. The video driver 91 and the printer driver 96

are included in the operating system, and image data D for transmitting to a printer 22 will be outputted to it through these drivers from an application program 95. The application program 95 which performs the retouch of an image etc. reads an image from a scanner 12, and it shows the image to CRT21 through a video driver 91, performing predetermined processing to this. The data ORG supplied from a scanner 12 are the original color picture data ORG which are read in a color copy and consist of a color component of (Red R) Green (G) and three colors of blue (B). [0018] If this application program 95 emits a printing instruction, the printer driver 96 of a computer 90 will change image data into reception from an application program 95, and will have changed this into the signal (signal multiple-value-sized here about each color of cyanogen, a Magenta, Hierro, light cyanogen, a light Magenta, and black) which can process a printer 22. The interior of a printer driver 96 is equipped with the resolution conversion module 97, the color correction module 98, the halftone module 99, and the rasterizer 100 in the example shown in drawing 2. Moreover, the color correction table LUT and the dot formation pattern table DT are memorized.

[0019] The resolution conversion module 97 is changed into the resolution of the color picture data (it consists of three colors of RGB) which the application program 95 is treating, i.e., the resolution in which a printer driver 96 can treat the number of pixels per unit length, the cyanogen (C) for which a printer 22 uses the image data by which resolution conversion was carried out for every pixel, the color correction module 98 referring to the color correction table LUT, a Magenta (M), light cyanogen (LC), a light Magenta (LM), and Hierro — it changes into the data of each color of (Y) and black (K).

[0020] The data by which color correction was carried out have the predetermined gradation value. A printer 22 expresses this gradation value by distributing and forming a dot. When the halftone module 99 performs half toning to data, data turn into data with which a printer 22 can express a gradation value by formation of such a dot. The halftone module 99 performs this half toning, after setting up the dot formation pattern of each ink dot with reference to the dot formation pattern table DT according to the gradation value of image data. The processed image data is rearranged into the sequence transmitted to a printer 22 by the rasterizer 100, and is outputted as final print-data PD. Print-data PD contains the data in which the raster data showing the record condition of the dot at the time of each horizontal scanning and a vertical-scanning feed per revolution are shown. In this example, although it is only playing the role which forms a dot according to print-data PD and the printer 22 is not performing the image processing, it does not interfere as what performs these processes by the printer 22.

[0021] Next, drawing 3 explains the outline configuration of a printer 22. The device in which this printer 22 conveys a print sheet P by the paper feed motor 23 so that it may illustrate. The guides 29a and 29b (not shown in drawing 3) which guide a print sheet P in the case of conveyance. The device in which carriage 31 is made to reciprocate to the shaft orientations of a platen 26 by the carriage motor 24, it consists of a device in which drive the print head 28 carried in carriage 31, and formation of the regurgitation of ink and an ink dot is performed, and a control circuit 40 which manages an exchange of a signal with these paper feed motors 23, the carriage motor 24, the print head 28, and a control panel 32.

[0022] The device in which carriage 31 is made to reciprocate to the shaft orientations of a platen 26 is constructed over the shaft of a platen 26, and parallel, and consists of location detection sensor 39 grades which detect the pulley 38 which stretches the endless driving belt 36 between the sliding shafts 34 and the carriage motors 24 which hold carriage 31 possible [sliding], and the home position of carriage 31.

[0023] carriage 31 — the cartridge 71 for black ink (K), cyanogen (C), light cyanogen (LC), a Magenta (M), light MAZENDA (LM), and Hierro — the cartridge 72 for color ink which contained the ink of six colors of (Y) can be carried. A total of six heads 61 for ink regurgitation thru/ or 66 are formed in the print head 28 of the lower part of carriage 31, and the introductory tubing 67 which leads the ink from an ink tank to each of this head for colors is set up by the pars basilaris ossis occipitalis of carriage 31. If carriage 31 is equipped with the cartridge 71 for black (K) ink, and the cartridge 72 for color ink from the upper part, the introductory tubing 67 will be inserted in the connection hole prepared in each cartridge, and supply of the head 61 for regurgitation

thru/or the ink of 66 will be attained from each ink cartridge.

[0024] Drawing 4 is the explanatory view having shown the structure of piezo-electric element PE and Nozzle Nz in the detail. Piezo-electric element PE which is one of the electrostriction components and was excellent in responsibility is arranged for every nozzle the head 61 of each color prepared in the carriage 31 lower part thru/or 66. And piezo-electric element PE is installed in the location adjacent to the ink path 68 to which ink is led to Nozzle Nz so that it may illustrate on the drawing 4 upper case. The crystal structures of piezo-electric element PE are distortion and the component which changes electric-mechanical energy into a high speed extremely by impression of an electrical potential difference as everyone knows. Piezo-electric element PE elongates only the impression time amount of an electrical potential difference, and makes one side attachment wall of the ink path 68 deform in this example, by impressing the electrical potential difference of predetermined time width of face to inter-electrode [which was prepared in the both ends of piezo-electric element PE], as shown in the drawing 4 lower berth. Consequently, it contracts according to elongation of piezo-electric element PE, and the ink equivalent to a part for this contraction serves as Particle Ip, and the volume of the ink path 68 is breathed out by the high speed from the tip of Nozzle Nz. Printing is performed when this ink particle Ip sinks into the form P with which the platen 26 was equipped.

[0025] Drawing 5 is the explanatory view showing the array of the ink jet nozzle Nz in the heads 61-66 for ink regurgitation. Arrangement of these nozzles consists of 6 sets of nozzle arrays which carry out the regurgitation of the ink for black (K), cyanogen (C), and light (cyanogen LC) (Magenta M) light MAZENDA (LM) (Hiero Y) each color of every, and is arranged by the single tier in the nozzle pitch k with 48 fixed nozzles, respectively. A "nozzle pitch" is a value which shows a part for what raster (a part for namely, what pixel) spacing of the direction of vertical scanning of the nozzle allotted on the print head is. Here, a "raster" is the train of the pixel on a par with a main scanning direction. And a "pixel" is the grid of the shape of a grid virtually defined on print media, in order to specify the location which an ink droplet is made to reach the target and records a dot. For example, the pitch k of the nozzle which opens spacing for three rasters in between, and is allotted is 4.

[0026] Drawing 6 is the explanatory view showing the electric configuration of a photograph reflector. As shown in carriage 31 inferior surface of tongue at drawing 5, the photograph reflector 33 is formed in the location same about the direction of vertical scanning as nozzle #4. In addition, as for the photograph reflector 33, it is [that what is necessary is to just be prepared near the nozzle of #1 located in the edge of the downstream of the direction of vertical scanning] more desirable than the nozzle of #1 to prepare in the upstream only several times of the pitch of a nozzle. This photograph reflector 33 prepares 33d of light emitting diodes, and photo transistor 33t as one, as shown in drawing 6. 33d of light emitting diodes injects light towards a predetermined detection point, and they change change of the quantity of light into change of a current in response to the reflected light photo transistor 33t. CPU41 in a control circuit 40 judges whether some print sheets P are in a detection point according to whether photo transistor 33t received the reflected light reflected by the print sheet P.

[0027] This photograph reflector 33 is equivalent to the "detection section" said to a claim. And 33d of light emitting diodes is equivalent to a "light-emitting part", and photo transistor 33t is equivalent to a "light sensing portion." In addition, a light-emitting part can also be used as laser that what is necessary is just what can inject light towards a predetermined detection point. Moreover, a light sensing portion can also be used as a photodiode that what is necessary is just what can receive the reflected light which light reflected in said print media.

[0028] Drawing 7 is the top view showing the circumference of a platen 26. The platen 26 is formed in the direction MS of horizontal scanning for a long time than the width of face of a print sheet P so that each nozzle of the print head 28 may be faced in horizontal scanning. And the upstream paper feed rollers 25a and 25b are formed in the upstream of a platen 26. They are two or more small rollers which upstream paper feed roller 25b rotates freely to upstream paper feed roller 25a being one driving roller. Moreover, the downstream paper feed rollers 25c and 25d are formed in the lower stream of a river of a platen. Downstream paper feed roller 25c is two or more rollers formed in the driving shaft, and downstream paper feed roller 25d is two or more

small rollers which rotate freely. Downstream paper feed roller 25c and upstream paper feed roller 25a rotate synchronously so that the speed of a periphery may become equal.

[0029] The print head 28 reciprocates the platen 26 top inserted into these upstream paper feed rollers 25a and 25b and the downstream paper feed rollers 25c and 25d in horizontal scanning. A print sheet P is held at the upstream paper feed rollers 25a and 25b and the downstream paper feed rollers 25c and 25d, and it is supported so that the nozzle train of the print head 28 may be faced by the top face of a platen 26 in a part in the meantime. And an image is recorded one by one in the ink which vertical-scanning delivery is carried out and breathed out from the nozzle of the print head 28 with the upstream paper feed rollers 25a and 25b and the downstream paper feed rollers 25c and 25d.

[0030] Moreover, 26f of upstream slots and downstream slot 26r are prepared in the upstream and the downstream of the direction of vertical scanning at the platen 26, respectively. 26f of upstream slots and downstream slot 26r are prepared in the main scanning direction for a long time than the width of face of a print sheet P, respectively. Downstream slot 26r is prepared in the location which faces some nozzle groups Nr (nozzle of the part shown with a slash in drawing 7) of the downstream which contains the nozzle of a downstream edge among the nozzles N on the print head 28. However, the width of face of downstream slot 26r is wider than the width of face of the direction of vertical scanning of the nozzle group Nr. And 26f of upstream slots is established in the location which faces some nozzle groups Nf (not shown in drawing 7) of the upstream which contains the nozzle of an upstream edge among the nozzles on the print head 28. And the width of face of 26f of upstream slots is wider than the width of face of the direction of vertical scanning of the nozzle group Nf.

[0031] Moreover, left-hand side slot 26a and right-hand side slot 26b which are prolonged in the direction of vertical scanning so that each both ends with 26f of upstream slots and downstream slot 26r may be connected are prepared in the platen 26. Left-hand side slot 26a and right-hand side slot 26b are prepared in the range of the direction of vertical scanning for a long time than the impact range of the ink droplet from the nozzle train on the print head. And left-hand side slot 26a and right-hand side slot 26b are prepared so that spacing (main scanning direction) of each center lines may become equal to the width of face of the main scanning direction of a print sheet P. In addition, when a print sheet P is in the predetermined horizontal-scanning location guided with Guides 29a and 29b, left-hand side slot 26a and right-hand side slot 26b should just be prepared so that one side edge section Pa of the direction of horizontal scanning of a print sheet P may be located on left-hand side slot 26a and the side edge section Pb of another side may be located on right-hand side slot 26b. Therefore, as mentioned above, when a print sheet P is in an orientation, it may be prepared so that the side edge section of a print sheet P may be located inside the center line of left-hand side slot 26a and right-hand side slot 26b in addition to the mode which has the side edge section on the center line of left-hand side slot 26a and right-hand side slot 26b.

[0032] It connects mutually, and 26f of these upstream slots, downstream slot 26r, left-hand side slot 26a, and right-hand side slot 26b constitute the slot of a quadrilateral. And the absorption member 27 for absorbing this in response to an ink droplet Ip is allotted to the pars basilaris ossis occipitalis.

[0033] The print sheet P passes through the opening top of 26f of upstream slots, and downstream slot 26r, while it is having vertical-scanning delivery carried out by the upstream paper feed rollers 25a and 25b and the downstream paper feed rollers 25c and 25d. Moreover, the print sheet P is positioned about the main scanning direction with Guides 29a and 29b so that the right-hand side edge Pb may be located on right-hand side slot 26b on a platen 26 by locating the left-hand side edge Pa on left-hand side slot 26a.

[0034] Next, the internal configuration of the control circuit 40 (refer to drawing 3) of a printer CPU41, PROM42, and RAM43, the buffer 44 for a drive which outputs ON of an ink dot and the signal of OFF to the heads 61-66 for ink regurgitation are formed in the interior of a control circuit 40, and these components and circuits are mutually connected by bus. A control circuit 40 stores the dot data processed by computer 90 in reception, stores this in RAM43 temporarily,

and outputs it to the buffer 44 for a drive to predetermined timing.

[0035] Conveying Form P by the paper feed motor 23, it makes carriage 31 reciprocate by the carriage motor 24, drives the piezo-electric element of each nozzle unit of the print head 28 to coincidence, performs the regurgitation of each color ink droplet Ip, forms an ink dot, and the printer 22 which has the hardware configuration explained above forms a multicolor image on Form P.

[0036] In addition, in the printer of this example, in order to print the upper limit Pf of a print sheet P on downstream slot 26r and to print a lower limit Pr on 26f of upstream slots so that it may mention later, different printing processing from the interstitial segment of a print sheet is performed [near the print sheet near the lower limit near the upper limit]. In addition, on these specifications, "upper limit processing" and printing processing [processing / processing / in the interstitial segment of a print sheet / printing / intermediate processing intermediate treatment], a call and near the upper limit of a print sheet / printing / near the lower limit of a print sheet [are called "lower limit processing," Moreover, when calling upper limit processing and lower limit processing collectively, it is called "vertical edge processing,".

[0037] Moreover, the width of face W of the direction of vertical scanning of 26f of upstream slots and downstream slot 26r can be defined by the following formula.

[0038] $W = \text{prr} + \alpha$ [0039] Here, p is 1 time of the feed per revolution [an inch] of vertical-scanning delivery in vertical edge processing, n is the count of vertical-scanning delivery carried out in upper limit processing and each lower limit processing, alpha is the error of vertical-scanning delivery assumed in upper limit processing and each lower limit processing. As for the value of alpha in lower limit processing (26f of upstream slots), it is desirable to set up more greatly than the value of alpha in upper limit processing (downstream slot 26r). The slot which has only the width of face which can catch enough the ink droplet breathed out from a nozzle in the case of defining the width of face of the slot of a platen by the above formulas, then vertical edge processing can be prepared.

[0040] C. Arrangement of a print sheet : drawing 8 is the top view showing arrangement of each part when arranging a print sheet P on a platen 26 first in an ink jet printer. In drawing 8, a print sheet P is caudal turned from the upper part, and vertical-scanning delivery is carried out to the sense of an arrow head SS. In that case, a print sheet P is guided with Guides 29a and 29b (refer to drawing 7), and vertical-scanning delivery is carried out so that a both-sides edge may be located on left-hand side slot 26a of a platen 26, and right-hand side slot 26b.

[0041] In case vertical-scanning delivery of the print sheet P is carried out towards the center-section 26c top of a platen 26, the carriage 31 of the print head 28 is allotted to the left-cleaning location on a platen 26 as shown in drawing 8. And when carriage 31 is in the location of drawing 8, the photograph reflector 33 is located on the predetermined detection point DP in 26d of connection parts of left-hand side slot 26a and downstream slot 26r. In this location, 33d of light emitting diodes of the photograph reflector 33 can inject light towards the detection point DP. This detection point DP is a position within the limits in which the nozzle on the print head 28 exists about the location of the direction of vertical scanning. CPU41 can detect whether a print sheet P exists in the detection point DP by the photograph reflector 33.

[0042] Since the photograph reflector 33 can detect a print sheet, without contacting a print sheet, unlike the case where it is the sensor of a contact process, it does not become obstructive in subsequent printing. Moreover, since the photograph reflector 33 is formed in carriage, it does not cross the locus of the ink droplet in horizontal scanning. Therefore, there is little possibility that will apply ink and detectability ability will deteriorate. And since the detection point DP of the photograph reflector 33 is a position within the limits in which a nozzle exists about the direction of vertical scanning, if it arranges a print sheet P near the location of the print sheet P at the time of detecting a print sheet P and an ink droplet is made to breathe out from a nozzle, it can form an image at the tip of a print sheet P without a margin.

[0043] First, vertical-scanning delivery of the print sheet P is carried out to the sense of an arrow head SS from the condition which does not have a print sheet P on a platen 26. And the photograph reflector's 33 detection of the tip stops vertical-scanning delivery of a print sheet P. In this example, the photograph reflector 33 is formed in the location of nozzle #4, CPU41

performs vertical-scanning delivery slightly, after that photograph reflector 33 detects a print sheet P, and it stops vertical-scanning delivery so that the upper limit Pf of a print sheet P may be located in the location of the direction upstream of vertical scanning (direction contrary to an arrow head SS) by the number raster rather than the location of the nozzle (this nozzle is hereafter called a "lower limit nozzle") of the edge of the lower stream of a river of the direction of vertical scanning. As a result of making vertical-scanning delivery of a print sheet P as mentioned above, a print sheet P will be supported by center-section 26c of a platen 26, and the upper limit (upper limit) is located in the drawing bottom in drawing 8) will be located on downstream slot 26r. In addition, the left-hand side edge Pa of a print sheet P is located on left-hand side slot 26a, and the right-hand side edge Pb is located on right-hand side slot 26b.

[0044] Then, it is moved to the right end and side of carriage ** like drawing 7, and printing is started. That is, horizontal scanning is performed, making an ink droplet breathe out from a nozzle. In addition, even if it performs vertical-scanning delivery of a print sheet P, when the photograph reflector 33 cannot detect a print sheet P at the detection point DP, CPU41 transmits the signal of an error to a computer 30, and stops printing.

[0045] D. Upper limit processing : record an image without a margin to the upper limit of a print sheet in this example. The record in the upper limit section Pf of a print sheet P is recorded by the nozzle Nr allotted to the location on downstream slot 26r, and the corresponding location about the direction of vertical scanning in that case. And as shown in drawing 7, some nozzles containing the lower limit nozzle of the nozzles Nr are located in the direction lower stream of a river of vertical scanning (the direction of an arrow head SS) rather than the upper limit of a print sheet P. In other words, a print sheet P is arranged so that the upper limit Pf of a print sheet P may be located in the direction upstream of vertical scanning rather than a lower limit nozzle.

[0046] a theory top — a lower limit nozzle — the upper limit of a print sheet P — an image is recordable without arranging a print sheet P to the print head 28, and starting record of a dot, then the until [upper limit full] margin of a print sheet P so that it may be located in a last-minute location. However, in the case of vertical-scanning delivery, an error may arise about a feed per revolution. Moreover, the discharge direction of an ink droplet may shift according to the manufacture error of the print head 28 etc. In this example, rather than the lower limit nozzle, the upper limit Pf of a print sheet P arranges a print sheet P so that it may be located in the upstream, and it is printing the upper limit section Pf of a print sheet P. For this reason, a margin does not arise in the upper limit of a print sheet about the case where the impact location of the ink droplet to a print sheet top shifts.

[0047] Drawing 9 is the side elevation showing the print head 28 at the time of printing initiation, and the relation of a print sheet P. Here, in order to simplify explanation, the number of nozzles is explained as eight pieces. Center-section 26c of a platen 26 is counted from the nozzle of the 28 print head#2, by two rasters, from the back location, shall be counted from the nozzle of #7 and shall be prepared in the range R26 to the location of 2 raster quota. Therefore, even when an ink droplet Ip is made to breathe out from each nozzle in the condition that there is no print sheet, the ink droplet from the nozzle of #1, #2, #7, and #8 does not reach a platen 26.

[0048] In drawing 7, the nozzle group Nr of the part shown with the slash of the print head 28 is the part in which the nozzle of #1 and #2 is located. Downstream slot 26r is prepared under the part which those nozzles pass in the case of horizontal scanning. And printing is started when the upper limit Pf of a print sheet P is on downstream slot 26r. In this example, since the upper limit section Pf of a print sheet P is printed using the nozzle of #2 which exist right above the upper limit section Pf of a print sheet P, and the nozzle of #1 on the outside of the upper limit section Pf of a print sheet P, an image can be printed, without making a margin in the upper limit section of a print sheet P. Moreover, since the print sheet P is positioned using the photograph reflector 33, a print sheet P can be correctly arranged to the nozzle used for upper limit processing. Furthermore, also when the location of a print sheet shifts according to the error of vertical-scanning delivery etc., since the nozzle of #1 and #2 is on downstream slot 26r, an ink droplet does not reach center-section 26c of a platen 26.

[0049] Drawing 10 is the top view showing the relation between image data D and a print sheet

P. In this example, image data D is set up to the outside of a print sheet P exceeding the upper limit Pf of a print sheet P. Moreover, image data D is similarly set up to the outside of a print sheet P across the edge of a print sheet P about a lower limit Pr, the left-hand side edge Pa, and the right-hand side edge Pb. Therefore, in this example, the relation between the assumption location of the magnitude of image data D and a print sheet P and image data D at the time of printing and arrangement of a print sheet P comes to be shown in drawing 10. In addition, about the name of right and left of the left-hand side edge Pa and the right-hand side edge Pb, since it was made to correspond with the name of right and left of a printer 22, in the print sheet P, actual right and left and the name of the left-hand side edge Pa and the right-hand side edge Pb are reverse.

[0050] E. Printing of the right-and-left side edge section: drawing 11 is the explanatory view showing printing of the right-and-left side edge section of a print sheet P. Including upper limit processing and lower limit processing, through the whole record of the image to a print sheet P, in this example, it prints so that a margin may not be prepared in the right-and-left edge of a print sheet P, either. In that case, in horizontal scanning, the print head 28 is sent till the place where all nozzles are located in the outside of a print sheet P across the edge of a print sheet P, and is sent about one edge till the place where all nozzles are too located in the outside of a print sheet P also about an other end exceeding the other end of a print sheet P. And not only when Nozzle Nz is on a print sheet P, but when it is the location where Nozzle Nz exceeded the edge of a print sheet P and is on left-hand side slot 26a or right-hand side slot 26b, according to image data D, the regularization of the ink droplet is carried out from the nozzle Nz.

[0051] By performing such printing, also when a print sheet P shifts to a main scanning direction somewhat, an image can be formed, without making a margin to the both ends of right and left of a print sheet P. Moreover, when the detection point DP of the photograph reflector 33 is in 26d of connection parts of left-hand side slot 26a and downstream slot 26c and a print sheet P cannot be detected at the detection point DP, since it stops with printing, it can print by arranging a print sheet P in a right location also about a main scanning direction. And since the nozzle which prints the both-sides edge of a print sheet is a nozzle located on left-hand side slot 26a or right-hand side slot 26b, also when an ink droplet shifts from a print sheet P, an ink droplet reaches left-hand side slot 26a or right-hand side slot 26b, without reaching center-section 26c of a platen 26. Therefore, a print sheet P is not soiled by the ink droplet which reached center-section 26c of a platen 26.

[0052] F. Lower limit processing: drawing 12 is the top view showing 26f of upstream slots at the time of printing the lower limit section Pr of a print sheet P, and the relation of a print sheet P. In this example, an image is recorded without a margin to the edge of a print sheet P about a lower limit as well as the case of upper limit. In drawing 12, it is the part in which the nozzle for which the nozzle group Nf of the part shown with the slash of the print head 28 carries out lower limit processing is located. 26f of upstream slots is prepared under the part which those nozzles pass in the case of horizontal scanning. And when the lower limit Pr of a print sheet P is located in the location shown with the alternate long and short dash line on 26f of upstream slots, printing of the lower limit section Pr is performed and printing is ended after that. At this time, some nozzles of the nozzle groups Nf are located in the direction upstream of vertical scanning rather than the lower limit (it sets to drawing 12 and is the edge of a drawing top) of a print sheet P.

[0053] the case of upper limit processing — the same — the nozzle (this nozzle is hereafter called an "upper limit nozzle") of the direction of vertical scanning maximum upstream — the lower limit of a print sheet P — when located in a last-minute location, a thing [which record the dot of a lower limit / to do], then theory top can record the until [lower limit full] image of a print sheet. However, in this example, when the lower limit of a print sheet P is located downstream rather than an upper limit nozzle, it prints the lower limit section Pr of a print sheet P. Therefore, a margin does not arise in the lower limit of a print sheet about the case where the impact location of the ink droplet to a print sheet top shifts.

[0054] Drawing 13 is the side elevation showing the print head 28 at the time of printing the lower limit section Pr of a print sheet P, and the relation of a print sheet P. In case the lower

limit section Pr of a print sheet P is printed, the lower limit Pr of a print sheet P is located on 26f of upstream slots. And printing of the lower limit section Pr of a print sheet P is carried out using the nozzle of #7 which exist right above the lower limit section Pr, and the nozzle of #8 on the outside of the lower limit section Pr of a print sheet P. For this reason, the printer 22 of this example can print an image, without making a margin in the lower limit section Pr of a print sheet P. Moreover, in case the printer 22 of this example starts printing, it is positioning the print sheet P using the photograph reflector 33. For this reason, as long as vertical-scanning delivery after printing initiation is performed correctly, a print sheet P can be correctly arranged to the nozzle used in the case of lower limit processing. Furthermore, also when the location of a print sheet shifts according to the error of vertical-scanning delivery etc., since the nozzle of #7 and #8 is on 26f of upstream slots, an ink droplet does not reach center-section 26c of a platen 26.

[0055] G. modification: — the range which this invention is not restricted to an above-mentioned example or an above-mentioned operation gestalt, and does not deviate from that summary in addition — setting — various voice — it is possible to set like and to carry out, for example, the following deformation is also possible.

[0056] G1. modification 1: In the above-mentioned example, the detection section was prepared on [one] carriage 31. However, the detection section can also be prepared in other parts of a printer 22. For example, carriage 31 is better for the location further distant from the platen than the space through which carriage 31 passes in horizontal scanning also as preparing the detection section independently. The existence of the print sheet in a detection point can be detected without moving such a mode, then carriage 31. And it is not influenced [the] also when a dimension error arises in the location of the carriage in horizontal scanning. Furthermore, two or more detection sections corresponding to a detection point different, respectively can be prepared. This can be detected also when a print sheet shifts to preparing the detection section on a left-hand side slot and a right-hand side slot, respectively, then which sense of a main scanning direction.

[0057] Moreover, the detection section can also consider as the mode which moves independently [carriage 31] on the sliding shaft 34. And it does not become trouble in the case of moving the detection section so that carriage and the detection section may not interfere in the case of printing, then printing. Compared with such a mode, then the mode which prepares the detection section in the location which is further distant from a platen from the above-mentioned carriage 31, the dimension of the height direction of a printer can be made small.

[0058] Drawing 14 is the top view showing the circumference of the platen 26 of a modification. The detection section may be further prepared in the lower stream of a river of the direction of vertical scanning again rather than the location to which carriage 31 goes and comes back in horizontal scanning. By detecting print media by the detection section (photograph reflector 33a) also as such a mode, print media can be positioned correctly, a dot can be recorded and an image can be formed on a record medium. However, to allot Mizogami the upper limit section of a print sheet and print without a margin to the upper limit of a print sheet with Mizogami's nozzle, in such a mode, it is necessary to turn a print sheet to the upstream of the direction of vertical scanning, and to send a print sheet in the direction contrary to usual.

[0059] It can also consider as the mode which prepares the detection section in the upstream of the direction of vertical scanning further on the other hand rather than the location to which carriage 31 goes and comes back in horizontal scanning. In such a mode, after detecting a print sheet in the detection section, after only the specified quantity performs vertical-scanning delivery, a print sheet can be arranged so that starting printing, then the upper limit of print media may come to the location of arbitration, and printing can be started. Therefore, after print sheet detection, vertical scanning can be performed so that the upper limit of a print sheet may come to Mizogami, and edge printing can also be performed with Mizogami's nozzle from the condition. Thus, the purpose of detecting the location of print media with allotting the detection section to the lower stream of a river or the upstream of the direction of vertical scanning, then simple structure can be attained, and equipment can also be made smaller than the location to which carriage 31 gone and comes back in horizontal scanning.

[0060] G2. modification 2: In the above-mentioned example, although both upper limit processing

and lower limit processing were performed, the need is accepted and it may be made to perform only a gap or one side. Moreover, it is good also as carrying out neither upper limit processing nor lower limit processing. Although the airline printer of this example equipped the upstream and the downstream of the direction of vertical scanning of a platen 26 with 26f of upstream slots, and downstream slot 26f, respectively and equipped right and left with left-hand side slot 26a and right-hand side slot 26b, it is good also as what is alternatively equipped with either among these. In such a case, as for printing of each edge of a print sheet P, it is desirable to be carried out using the line crack about the edge in which the corresponding slot is established, and the nozzle which is on a slot, respectively. Moreover, it is good also as positioning a print sheet P correctly on the platen which is not equipped with a slot, establishing a margin on all sides, and printing an image in the exact location in a print sheet P.

[0061] G3, modification 3: You may make it transpose a part of configuration of that hardware was realized to software, and may make it transpose a part of configuration of that software realized to hardware conversely in the above-mentioned example. For example, a host computer 90 can perform a part of function of CPU41 (drawing 3).

[0062] The computer program which realizes such a function is offered with the gestalt recorded on the record medium which a floppy disk, CD-ROM, etc. can computer read. A host computer 90 reads a computer program in the record medium, and transmits it to internal storage or external storage. Or you may make it supply a computer program to a host computer 90 from a program feeder through a communication path. When realizing the function of a computer program, the computer program stored in internal storage is performed by the microprocessor of a host computer 90. Moreover, a host computer 90 may be made to carry out immediate execution of the computer program recorded on the record medium.

[0063] In this specification, in the host computer 90, it is a concept containing hardware and operation system, and the hardware which operates under control of operation system is meant. A computer program makes such a host computer 90 realize the function of above-mentioned each part. In addition, a part of above-mentioned function may be realized by not an application program but operation system.

[0064] In addition, in this invention, not only the record medium of a flexible disk or a pocket mold like CD-ROM but the internal storage in computers, such as various kinds of RAM and ROM, and the external storage currently fixed to computers, such as a hard disk, are included with the record medium in which computer reading is possible."

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.

2.*** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The top view showing the structure of the platen circumference of the ink jet printer in the gestalt of operation of this invention simple.

[Drawing 2] The block diagram showing the configuration of the software of this airline printer.

[Drawing 3] Drawing showing the configuration of the machine part of this airline printer.

[Drawing 4] The explanatory view having shown the structure of piezo-electric element PE and Nozzle Nz in the detail.

[Drawing 5] The top view showing the example of the array of the nozzle unit for every color in the print head unit 60.

[Drawing 6] The explanatory view showing the electric configuration of a photograph reflector.

[Drawing 7] The top view showing the circumference of a platen 26.

[Drawing 8] The top view showing arrangement of each part when arranging a print sheet P on a platen 26 first in an ink jet printer.

[Drawing 9] The side elevation showing the print head 28 at the time of printing initiation, and the relation of a print sheet P.

[Drawing 10] The top view showing the relation between image data D and a print sheet P.

[Drawing 11] The explanatory view showing printing of the right-and-left side edge section of a print sheet P.

[Drawing 12] The top view showing 26f of upstream slots at the time of printing the lower limit section Pr of a print sheet P, and the relation of a print sheet P.

[Drawing 13] The side elevation showing the print head 28 at the time of printing the lowest edge of a print sheet, and the relation of a print sheet P.

[Drawing 14] The top view showing the circumference of the platen 26 of a modification.

[Drawing 15] The side elevation showing the circumference of the print head of the conventional printer.

[Description of Notations]

12 -- Scanner

21 -- CRT

22 -- Printer

23 -- Paper feed motor

24 -- Carriage motor

25a, 25b -- Upstream paper feed roller

25c, 25d -- Downstream paper feed roller

25p, 25q -- Upstream paper feed roller

25r, 25s -- Downstream paper feed roller

26 -- Platen

26a -- Left-hand side slot

26b -- Right-hand side slot

26c -- Center section

26d -- Connection part

26f -- Upstream slot

26o -- Platen

26r -- Downstream slot

27 -- Absorption member

28 -- Print head

28o -- Print head

29a, 29b -- Guide

31 -- Carriage

32 -- Control panel

33, 33a -- Photograph reflector

33d -- Light emitting diode

33t -- Photo transistor

34 -- Sliding shaft

36 -- Driving belt

38 -- Pulley

39 -- Location detection sensor

40 -- Control circuit

41 -- CPU

42 -- PROM

43 -- RAM

44 -- Buffer for a drive

45 -- PC interface

60 -- Print head unit

61-66 -- Head for ink regurgitation

67 -- Introductory tubing

68 -- Ink path

71 -- Cartridge

72 -- Cartridge for color ink

90 -- Computer

91 -- Video driver

95 -- Application program

96 -- Printer driver

97 -- Resolution conversion module

98 -- Color correction module

99 -- Half-tone module

100 -- Rasterizer

[Translation done.]

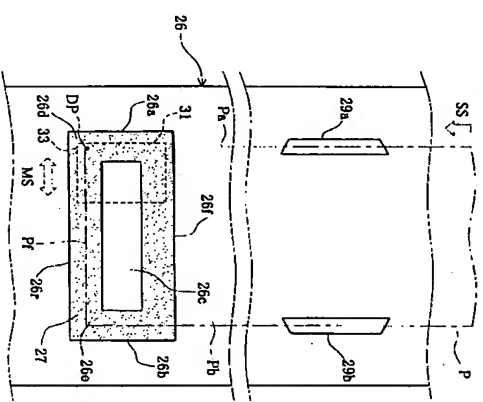
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| (54) 発明の名称 | センサにより印刷用紙の位置決めを行って印刷 | (72) 発明者 | 大綱 幸一 |
| | | 最終頁に続く | |

(57) 【要約】
【課題】 画像データを印刷用紙に対して正確に位置決めして印刷を行う。
【解決手段】 印刷用紙Pは、ガイド29a, 29bによってガイドされ、両側端がアラデン26の左側溝部26a、右側溝部26b上に位置するように副走査送りされる。その際、フオトリレクタ33を備えたキャリッジ31は被検で示す位置に配されている。フオトリレクタ33は、左側溝部26aと下流側溝部26rの接続部分26dに印刷用紙Pが存在するか否かを検知する。印刷用紙Pの前端がフオトリレクタ33によって検知されると、副走査送りは停止され、下流側溝部26r上にある一部のノズルによって印刷用紙Pの上端部P1(図1においては、下端となる。)の印刷が開始される。



【特許請求の範囲】
【請求項1】 インク滴を吐出する複数のドット形成要素が設けられたドット記録ヘッドを用いて印刷媒体の表面にドットの記録を行うドット記録装置であって、前記ドット記録ヘッドを前記印刷媒体に対して駆動して主走査を行う主走査駆動部と、前記主走査の最中に前記複数のドット形成要素のうちの少なくとも一部を駆動してドットの形成を行わせるヘッド駆動部と、前記主走査の方向と交わる方向に前記印刷媒体を駆動して副走査を行う副走査駆動部と、所定の吐出地点における前記印刷媒体の有無を検知するための検知部と、前記各部を制御するための制御部と、を備え、前記検知部は、前記主走査の際に前記ドット形成要素から吐出されるインク滴の軌跡と交わらない位置に設けられている、ドット記録装置、

【請求項2】 請求項1記載のドット記録装置であって、前記印刷媒体は、前記吐出地点に前記印刷媒体がない状態から前記印刷媒体の前記副走査を開始する機能と、前記検知部が前記印刷媒体を検知した場合に、前記副走査の方向に所定の副走査位置で前記印刷媒体の前記副走査を停止させる機能と、前記印刷媒体が前記所定の副走査位置にある状態で、前記ドット形成要素からインク滴を吐出させつつ前記主走査を開始する機能と、を備えるドット記録装置、

【請求項3】 請求項1記載のドット記録装置であって、前記検知部は、前記主走査の際に前記ドット記録ヘッドと、前記副走査の際に前記ドット記録ヘッドと、を有するドット記録装置、

【請求項4】 請求項1記載のドット記録装置であって、前記検知部は、前記主走査の際に前記ドット記録ヘッドと、前記副走査の際に前記ドット記録ヘッドと、を有するドット記録装置、

【請求項5】 請求項4記載のドット記録装置であって、前記検知部は、前記主走査の際に前記ドット記録ヘッドと、前記副走査の際に前記ドット記録ヘッドと、を有するドット記録装置、

【請求項6】 請求項1記載のドット記録装置であって、さらに、前記主走査の行路の少なくとも一部において前記ドット形成要素と向かい合うように、前記主走査の方向に延長

して設けられ、前記印刷媒体を支持するグラブを備え、前記グラブは、少なくとも前記複数のドット形成要素のうち前記副走査の方向の下流側の端に位置するドット形成要素と向かい合う位置に、前記主走査の方向に延長して設けられた下流側溝部を有しており、前記吐出地点は、前記下流側溝部の開口内で、かつ、前記副走査の方向に所定の副走査位置で前記印刷媒体の位置決めする位置である、ドット記録装置、

【請求項7】 請求項6記載のドット記録装置であって、前記グラブは、さらに、前記副走査の方向について、少なくとも前記ドット形成要素からのインク滴の噴射範囲を含む範囲に設けられ、前記下流側溝部とつながっている側方溝部を有し、前記副走査の際に前記主走査の方向について所定の副走査位置に前記印刷媒体を位置決めするためのガイド部を備え、前記所定の副走査位置は、前記印刷媒体が前記主走査の方向に所定の副走査位置に前記印刷媒体の位置決めする位置である、ドット記録装置、

【請求項8】 請求項7記載のドット記録装置であって、前記側方溝部は、第1の側方溝部と、第2の側方溝部と、の一方に設けられており、前記第1の側方溝部と前記第2の側方溝部とは、前記印刷媒体が前記所定の副走査位置にあるとき、前記印刷媒体の前記主走査の方向の一方の側端部が前記第1の側方溝部上に位置し、他方の側端部が前記第2の側方溝部上に位置するように設けられている、ドット記録装置、

【請求項9】 インク滴を吐出する複数のドット形成要素が設けられたドット記録ヘッドと、主走査の際の前記ドット形成要素のインク滴の軌跡と交わらない位置に設けられ所定の吐出地点における前記印刷媒体の有無を検知するための検知部と、を備え、前記印刷媒体の表面にドットの記録を行うドット記録装置を使用したドット記録方法であって、(a) 前記主走査の方向と交わる方向に前記印刷媒体を駆動する副走査である副走査を、前記吐出地点に前記印刷媒体がない状態から開始する工程と、(b) 前記検知部が前記印刷媒体を検知した場合に、前記副走査の方向に所定の副走査位置で前記印刷媒体の前記副走査を停止させる工程と、(c) 前記印刷媒体が前記副走査の副走査位置にある状態で、前記ドット形成要素からインク滴を吐出させつつ前記主走査を開始する工程と、を備えることを特徴とするドット記録方法、

【請求項10】 インク滴を吐出する複数のドット形成

要案が設けられたドット記録ヘッドと、主走査の際の前記ドット形成要素のインク滴の軌跡と交わらない位置に設けられ所定の吐出地点における前記印刷媒体の有無を検知するための検知部とを有し、前記印刷媒体の表面にドット形成要素を備えるコンピュータに、ドット形成要素を備えるコンピュータプログラムを記録したコンピュータ読み取り可能な記録媒体であって、前記主走査の方向と交わる方向に前記記録媒体を移動する走査である副走査を、前記吐出地点に前記印刷媒体がない状態から開始する機能と、前記検知部が前記印刷媒体を検知した場合に、前記副走査の方向に関して所定の副走査位置で前記印刷媒体の前記副走査を停止させる機能と、前記印刷媒体が前記所定の副走査位置にある状態で、前記ドット形成要素からインク滴を吐出させつつ前記主走査を開始する機能と、前記コンピュータに実現させるためのコンピュータプログラムを記録しているコンピュータ読み取り可能な記録媒体、

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 この発明は、ドット記録ヘッドを用いて記録媒体の表面にドットの記録を行う技術に関し、特に、印刷用紙を正確に位置決めして印刷を行う技術に関する。

【0002】

【従来の技術】 近年、コンピュータの出力装置として、印刷ヘッドのノズルからインクを吐出するノズルヘッドが普及している。図15は、従来のノズルヘッド印刷ヘッドの周辺を示す側面図である。印刷用紙Pは、フラテン260の上流に配された上流側紙送りローラ25p、25q、およびフラテン260の下流に配された下流側紙送りローラ25r、25sによって、矢印Aの方向に送られ、所定の位置で停止される。そして、印刷用紙Pは、フラテン260の上でヘッド280に向かい合うように支持される。その後、印刷用紙を矢印Aの方向に少しづつ送りながら印刷ヘッドからフラテン260上の所定の位置に向けて多数のインク滴1pが吐出される。それらのインク滴1pがフラテン260上の印刷用紙Pに着弾し、印刷用紙に画像が記録される。

【0003】

【発明が解決しようとする課題】 上記のようなノズルヘッドにおいて、図15に示すように、放線で示す想定位置から印刷用紙がずれている場合、印刷用紙上の想定した位置に画像が形成されない。また、印刷用紙の端部近傍に形成される予定であった画像が、印刷用紙からはみ出してしまいうこともある。そのような場合には、図15に示すように、インク滴が本来着弾すべき印刷用紙端部からはずれてフラテン上に着弾してしまい、その後フラテン上を通る印刷用紙が、汚れてしまう。

【0004】 この発明は、従来技術における上述の課題を解決するためになされたものであり、印刷用紙を正確に位置決めして印刷を行う技術を提供することを目的とする。

【0005】

【課題を解決するための手段およびその作用・効果】 上述の課題の少なくとも一部を解決するため、本発明では以下の構成を採用した。本発明のドット記録装置は、インク滴を吐出する複数のドット形成要素が設けられたドット記録ヘッドを用いて印刷媒体の表面にドットの記録を行うドット記録装置である。そして、ドット記録ヘッドを印刷媒体に対して駆動して主走査を行う主走査駆動部と、主走査の途中に複数のドット形成要素のうち少なくとも一部を駆動してドットの形成を行わせるヘッド駆動部と、主走査の方向と交わる方向に印刷媒体を移動して副走査を行う副走査駆動部と、所定の吐出地点における印刷媒体の有無を検知するための検知部と、各部を制御するための制御部とを、備える。そして、検知部は、主走査の際にドット形成要素から吐出されるインク滴の軌跡と交わらない位置に設けられている。このようない構成とすれば、検知部によって印刷媒体を検出することによって、印刷媒体を正確に位置決めしてドットの記録を行い、記録媒体上に画像を形成することができる。

【0006】 なお、上記のドット記録装置において、以下のような印刷を行うことが好ましい。すなわち、吐出地点に印刷媒体がない状態から印刷媒体の副走査を開始する。そして、検知部が印刷媒体を検知した場合に、副走査の方向に関して所定の副走査位置で印刷媒体の副走査を停止させる。その後、印刷媒体が所定の副走査位置にある状態で、ドット形成要素からインク滴を吐出させつつ主走査を開始する。このような印刷によれば、印刷媒体の先端部が所定の吐出地点に到達したか否かを基準として印刷媒体の位置決めを行うことができる。よって、副走査方向について正確に印刷媒体の位置決めを行うことができる。

【0007】 また、検知部は、所定の吐出地点に向けて光を射出する発光部と、光が印刷媒体に当たって反射した反射光を受ける受光部とを、備えることが好ましい。このようにすれば、印刷媒体に接触することなく印刷媒体を検知することができる。印刷媒体へのドットの記録の際に邪魔になることがない。

【0008】 なお、検知部は、主走査の際にドット記録ヘッドと一体化で駆動されるように設けられていることが好ましい。このような態様とすれば、主走査においてドット記録ヘッドと検知部とが干渉することがない。

【0009】 また、検知部の位置は、副走査の方向については、印刷に使用されるドット形成要素のうちの副走査の方向の下流側の端に位置することが好ましい。このような態様とすれば、印刷媒体の先端部を印刷するドット形成要素

の近傍において、印刷媒体の有無を検知して印刷媒体の位置決めを行うことができる。よって、印刷媒体の先端部を印刷するドット形成要素に対して印刷媒体を正確に位置決めすることができる。

【0010】 なお、ドット記録装置は、主走査の行程の少なくとも一部においてドット形成要素と向かい合うように、主走査の方向に延長して設けられ、印刷媒体を支持するフラテンを備えることが好ましい。そして、以下のような構成とすることが好ましい。すなわち、そのフラテンは、少なくとも複数のドット形成要素のうち副走査の方向の下流側の端に位置するドット形成要素と向かい合う位置に、主走査の方向に延長して設けられた下流側溝部を有するものとする。そして、検知部の吐出地点は、下流側溝部の開口内で、かつ、副走査の方向に関してドット形成要素が存在する範囲内の所定の位置とする。このような態様とすれば、記録媒体の先端が下流側溝部の開口に位置することを検出して、ドット形成要素による記録媒体の先端近傍へのドットの記録を開始することができる。

【0011】 また、フラテンは、さらに、副走査の方向について、少なくともドット形成要素からのインク滴の着弾範囲を含む範囲に設けられ、下流側溝部とつながっている側方溝部を有する態様とし、さらに、以下のような構成とすることが好ましい。すなわち、ドット記録装置は、さらに、副走査の際に主走査の方向についての所定の主走査位置に印刷媒体を位置決めするためのガイド部を備える。そして、ガイド部が印刷媒体を位置決めする所定の主走査位置は、印刷媒体が主走査の方向に関してドット記録ヘッドの主走査の行程上に位置し、印刷媒体の主走査の方向の一方の側端部が、側方溝部の開口上に位置する位置とする。そして、検知部の吐出地点は、側方溝部と下流側溝部との接続部分の所定の位置とする。このような態様とすれば、記録媒体の先端が下流側溝部の開口に位置し、側端部が側方溝部の開口上に位置することを検出して、記録媒体へのドットの記録を開始することができる。

【0012】 なお、側方溝部を、第1の側方溝部と、第2の側方溝部と、の二対設けることが好ましい。そして、第1の側方溝部と第2の側方溝部とは、印刷媒体が所定の主走査位置にあるとき、印刷媒体の主走査の方向の一方の側端部が第1の側方溝部上に位置し、他方側の側端部が第2の側方溝部上に位置するように設けることが好ましい。このような態様とすれば、記録媒体の先端が下流側溝部の開口に位置し、一方の側端部が第1の側方溝部の開口上に位置するものを検出したときに、他方の側端部が第2の側方溝部の開口上に位置することとなる。そして、そのような配置を確認して、記録媒体へのドットの記録を開始することができる。

【0013】 なお、本発明は、以下に示すような種々の態様で実現することが可能である。

(1) ドット記録装置、印刷側溝装置、印刷装置。
(2) ドット記録方法、印刷側溝方法、印刷方法。
(3) 上記の装置や方法を実現するためのコンピュータプログラム。
(4) 上記の装置や方法を実現するためのコンピュータプログラムを記録した記録媒体。
(5) 上記の装置や方法を実現するためのコンピュータプログラムを含む搬送媒体内に具現化されたデータ信号。

【0014】

【発明の実施の形態】 以下で、本発明の実施の形態を実施例に基づいて以下の順序で説明する。

A. 実施形態の概要：
B. 装置の全体構成：
C. 印刷用紙の配置：
D. 上流処理：
E. 左右側端部の印刷：
F. 下流処理：
G. 変形例：

【0015】 A. 実施形態の概要：図1は、本発明の実施の形態におけるインクジェットヘッドのフラテン周辺の構造を簡略に示す平面図である。図1においては、印刷用紙Pは、上方から下方に向けて矢印SSの向きに副走査送りされる。この際、印刷用紙Pは、ガイド29a、29bによってガイドされ、両側端P a、P bがフラテン260の左側溝部26 a、右側溝部26 b上に位置するように副走査送りされる。一方、印刷用紙Pがフラテン26 b上に向けて副走査送りされる際には、印刷ヘッドのキャリッジ31は放線で示す位置に配されている。このキャリッジ31は、フラテン26と向かい合う面にフォトリソグラフィ33を備えている。このフォトリソグラフィ33は、キャリッジ31上において副走査方向の下流側の端のノズルよりもわずかに上流（矢印SSの逆の方向）の位置に設けられている。このフォトリソグラフィ33は、左側溝部26 aと下流側溝部26 rの接続部分26 dの所定の地点D Pに印刷用紙Pが存在するか否かを検知する。

【0016】 印刷用紙Pが矢印SSの方向に副走査送りされ、その前縁がフォトリソグラフィ33によって検知されると、印刷用紙Pの副走査送りは停止される。そして、印刷ヘッド上のノズルは、印刷用紙Pの上端部P f（図1においては、下流となる。）の印刷が開始される。印刷ヘッド上のノズルは、印刷用紙Pの上端部P fよりも矢印SSの方向の先にまで設けられているので、印刷用紙Pの上流に余白を作ることなく画像を形成することができる。また、印刷に使用される、インク滴は下流側溝部26 r上にあるノズルであるため、インク滴が印刷用紙Pからはずれない場合にも、インク滴は下流側溝部26 r内に着弾し、フラテン260の中央部26 cに着弾することがない。よって、フラテン260の中央部26 cに

して、左側部26aと右側部26bは、それぞれの中心線同士の(主走査方向の)間隔が、印刷用紙Pの主走査方向の幅に等しくなるように設けられている。なお、左側部26aと右側部26bは、印刷用紙Pがガイド29a、29bによってガイドされる所定の主走査位置にあるとき、印刷用紙Pの主走査の方向の一方の側端部Paが左側部26a上に位置し、他方の側端部Pbが右側部26b上に位置するように設けられている。また、印刷用紙Pが定位置にあるとき、上記のように、印刷用紙Pが定位置にあるとき、その側端部が左側部26aと右側部26bの中心線にある側端部以外に、印刷用紙Pの側端部が左側部26aと右側部26bの中心線よりも内側に位置するように設けられていてもよい。

【0032】これら上流側部26f、下流側部26r、左側部26aおよび右側部26bは互いに接続されており、四辺形の導部を構成する。そして、その底部にはインク滴1pを受けてこれを吸収するための吸収部27が配されている。

【0033】印刷用紙Pは、上流側送りローラ25a、25bおよび下流側送りローラ25c、25dによって駆走送りを実施されているときには、上流側部26fと下流側部26rの開口上を通過していく。また、印刷用紙Pは、フレンチ26e上において、左側部Paは左側部26a上に位置し、右側部Pbは右側部26b上に位置するように、ガイド29a、29bによって主走査方向について位置決めされている。

【0034】次に、フレンチ222の制御回路40(図3参照)の内部構成を説明する。制御回路40の内部には、CPU41、ROM42、RAM43の他、コンピュタ90とデータのやり取りを行うPCIインタフェース45と、インク吐出ヘッド61~66にインクフットON、OFFの信号を出す駆動用フット44などが設けられており、これらの素子および回路はバスで相互に接続されている。制御回路40は、コンピュータ90で処理されたフットデータを受け取り、これを一時的にRAM43に蓄え、所定のタイミングで駆動用フット44に出力する。

【0035】以上説明したハードウェア構成を有するフレンチ22は、紙送りモータ23により用紙Pを搬送しつつ、キャリア31をキャリアモータ24により往復運動させ、同時に印刷ヘッド28の各ノズルユニットのヒートロッドを駆動して、各色インク滴1pの吐出を行い、インクドットを形成して用紙P上に多色の画像を形成する。

【0036】なお、本実施例のフレンチにおいては、後述するように、印刷用紙Pの上端Pfを下流側部26r上において、下端Prを上流側部26f上で印刷するため、印刷用紙Pの上端は上流側部26fにおいて、印刷用紙Pの中間部分には最も印刷処理が行われる。なお、この明細書では、印刷用紙Pの中間部分における印刷

処理を「中間処理」と呼び、また、印刷用紙Pの上端近傍における印刷処理を「上端処理」、印刷用紙Pの下端近傍における印刷処理を「下端処理」と呼ぶ。また、上端処理と下端処理とをまとめて呼ぶときには「上下端処理」と呼ぶ。

【0037】また、上流側部26fおよび下流側部26rの駆走方向の幅Wは、次の式で定めることができる。

$$[0038] W = p \times n + a$$

【0039】ここで、pは、上下端処理における駆走送りの1回の送り量(インチ)である。nは、上端処理、下端処理それぞれにおいて実施する駆走送りの回数である。aは、上端処理、下端処理それぞれにおいて指定される駆走送りの誤差である。下端処理(上流側部26f)におけるaの値は、上端処理(下流側部26r)におけるaの値よりも大きく設定しておくことが好ましい。上記のような式でフレンチの導部の幅を定めるとすれば、上下端処理の際にノズルから吐出されるインク滴を十分受け止められるだけの幅を有する導部を設けることができる。

【0040】C. 印刷用紙の配置: 図8は、インクジェットフレンチにおいて最初に印刷用紙Pをフレンチ26上配するときに各の各部の配置を示す平面図である。図8においては、印刷用紙Pは、上方から下方に向けて矢印Sの向きに駆走送りされる。その際、印刷用紙Pは、ガイド29a、29b(図7参照)によってガイドされ、両側端部がフレンチ26の左側部26a、右側部26b上に位置するように駆走送りされる。

【0041】印刷用紙Pがフレンチ26の中央部26c上に向けて駆走送りされる際には、印刷ヘッド28のキャリア31は、図8に示すようにフレンチ26上の左寄りの位置に配されている。そして、キャリア31が図8の位置にあるとき、フットリフレクタ33は、左側部26aと下流側部26rの接続部分26dにある所定の吐出地点Dp上に位置する。この位置において、フットリフレクタ33の発光ダイオード33dは吐出地点Dpに向けて光を射出することができる。この吐出地点Dpは、駆走方向の位置については、印刷ヘッド28上のノズルが存在する範囲内の所定の位置である。CPU41は、フットリフレクタ33によって、吐出地点Dpに印刷用紙Pが存在するか否かを検知することができる。

【0042】フットリフレクタ33は、印刷用紙に接触することなく印刷用紙を検知することができるため、接触式のセンサの場合と異なり、その後の印刷において邪魔になることがない。また、フットリフレクタ33はキャリア31に設けられているため、主走査におけるインク滴の軌跡と交わることはない。よって、インクがキャッチされて吐出性能が劣化する可能性が少なく、そして、フットリフレクタ33の吐出地点Dpは、駆走方向について

ノズルが存在する範囲内の所定の位置であるため、印刷用紙Pを吐出した際の印刷用紙Pの位置の近傍に印刷用紙を配して、ノズルからインク滴を吐出できれば、印刷用紙Pの先端に余白なく画像を形成することができる。

【0043】まず、フレンチ26上に印刷用紙Pがない状態から、矢印Sの向きに印刷用紙Pが駆走送りされる。そして、その先端がフットリフレクタ33によって検知されると、印刷用紙Pの駆走送りは停止される。本実施例では、フットリフレクタ33はノズル#4の位置に設けられている。CPU41は、そのフットリフレクタ33が印刷用紙Pを吐出してからわずかに駆走送りを行って、駆走方向の下流の端のノズル(以下、このノズルを「下端ノズル」と呼ぶ。)の位置よりも数フンスタ分だけ駆走方向上流(矢印Sと逆の方向)の位置に印刷用紙Pの上端Pfが位置するように、駆走送りを停止させる。上記のように印刷用紙Pの駆走送りがないとされた結果、印刷用紙Pは、フレンチ26の中央部26cによって支持され、その上端(図8において上端)図8の下側に位置する)は下流側部26r上に位置することとなる。なお、印刷用紙Pの左側部Paは左側部26a上に位置し、右側部Pbは右側部26b上に位置する。

【0044】その後、図7のようにキャリア31の右端側に移動され、印刷が開始される。すなわち、ノズルからインク滴を吐出させつつ主走査が行われる。なお、印刷用紙Pの駆走送りを行っても、フットリフレクタ33によって吐出地点Dpで印刷用紙Pを吐出することができない場合は、CPU41は、コンピュータ90にエラーの信号を送信して、印刷を中止する。

【0045】D. 上端処理: 本実施例では、印刷用紙の上端まで余白なく画像を記録する。その際、印刷用紙Pの上端部Pfにおける記録は、駆走方向について下流側部26r上の位置と対応する位置に配されているノズルN1によって記録される。そして、図7に示すように、ノズルN1のうちの下端ノズルを含む一部のノズルは、印刷用紙Pの上端よりも駆走方向下流(矢印Sの方向)に位置する。言い換えれば、印刷用紙Pの上端Pfが下端ノズルよりも駆走方向上流に位置するように印刷用紙Pが配置される。

【0046】理論上は、下端ノズルが印刷用紙Pの上端ぎりぎりの位置に位置するように、印刷ヘッド28に対して印刷用紙Pを配置してフットの記録を開始することとすれば、印刷用紙Pの上端については余白なく画像を記録することができる。しかし、駆走送りの際には送り量について誤差が生じる場合がある。また、印刷ヘッド28の製造誤差などによりインク滴の吐出方向がずれる場合もある。本実施例では、印刷用紙Pの上端Pfが、下端ノズルよりも、上流に位置するように印刷用紙Pを配して、印刷用紙Pの上端部Pfの印刷を実施して

いる。このため、印刷用紙上へのインク滴の着弾位置がずれた場合についても、印刷用紙の上端に余白が生じない。

【0047】図9は、印刷開始時の印刷ヘッド28と印刷用紙Pの関係を示す側面図である。ここでは、説明を簡単にするためノズルの数を8個として説明する。フレンチ26の中央部26cは、印刷ヘッド28のノズルから数えて2フンスタ分後の位置から、#7のノズルから数えて2フンスタ分前の位置までの範囲R26に設けられているものとする。したがって、印刷用紙がない状態で各ノズルからインク滴1pを吐出させた場合でも、#1、#2、#7、#8のノズルからのインク滴はフレンチ26に着弾することはない。

【0048】図7において、印刷ヘッド28の斜線で示した部分のノズル群N1が、#1、#2のノズルが位置する部分である。主走査の際にこれらのノズルが通過する部分の下方には、下流側部26rが設けられている。そして、下流側部26r上に印刷用紙Pの上端Pfがあるときに印刷が開始される。本実施例では、印刷用紙Pの上端部Pfの直上にある#2のノズルと、印刷用紙Pの上端部Pfの外側にある#1のノズルとを使用して印刷用紙Pの上端部Pfを印刷するので、印刷用紙Pの上端部に余白を作ることなく画像を印刷することができる。また、フットリフレクタ33を使用して印刷用紙Pの位置決めを行っているため、上端処理に使用するノズルに対して正確に印刷用紙Pを配置することができる。さらに、駆走送りの誤差などにより印刷用紙の位置がずれた場合でも、#1、#2のノズルは、下流側部26r上にいるため、インク滴がフレンチ26の中央部26cに着弾することはない。

【0049】図10は、画像データDと印刷用紙Pとの関係を示す平面図である。本実施例では、印刷用紙Pの上端Pfを超えて印刷用紙Pの外側まで画像データDを設定する。また、下端Pr、左側部Pa、右側部Pbについても同様、印刷用紙Pの端を超えて印刷用紙Pの外側まで画像データDを設定する。したがって、本実施例においては、画像データDと印刷用紙Pの大きさ、及び印刷時の画像データDの安定位置と印刷用紙Pの位置の関係は、図10に示すようになる。なお、左側部Pa、右側部Pbの左右の名称については、フレンチ22の左右の名称と対応させるため、印刷用紙Pにおいては、実際の左右と左側部Pa、右側部Pbの名称が逆になっている。

【0050】E. 左右側端部の印刷: 図11は、印刷用紙Pの左右側端部の印刷を示す側面図である。本実施例では、上端処理および下端処理を含め、印刷用紙Pへの画像の記録全体を通じて、印刷用紙Pの左右側端部にも余白を設けないように印刷を行う。その際、印刷ヘッド28は、主走査において、一方の端については、全てのノズルが印刷用紙Pの端を越えて印刷用紙Pの外側に位置

するとこちらまで送られ、他方の端についても、やはり全体的にノズルが印刷用紙Pの他方の端を越えて印刷用紙Pの外側に位置するところまで送られる。そして、ノズルN2が印刷用紙P上にあるときだけでなく、ノズルN2が印刷用紙Pの外側に位置するときでも、かつ、左側部26aまたは右側部26b上にあるときにも、画像データDにしたがってそのノズルN2からインク滴を吐出する。

【00511】このような印刷を行うことで、多少印刷用紙Pが主走査方向にずれた場合にも、印刷用紙Pの左右の両端に余白を作ることなく画像を形成することができる。また、フォトリソグラフィ33の後出地点D'Pは、左側部26aと下流側部26fの接続部分26dにあり、後出地点D'Pにおいて印刷用紙Pを送出できないときは印刷を中止することとしているため、主走査方向についても印刷用紙Pを正しい位置に配置して印刷を行うことができる。そして、印刷用紙の両側部を印刷するノズルは左側部26aまたは右側部26b上に位置するノズルであるため、インク滴が印刷用紙Pからはずれた場合にも、インク滴はグラフェン266の中央部26cに着弾することなく、左側部26aまたは右側部26cに着弾する。よって、グラフェン266の中央部26cに着弾したインク滴によって、印刷用紙Pが汚されることがない。

【00521】F. 下流処理：図12は、印刷用紙Pの下端部Pの印刷をする際の上流側部26fと印刷用紙Pの関係を示す平面図である。本実施例では、上流の場合と同様、下端についても印刷用紙Pの端まで余白なく画像を記録する。図12において、印刷ヘッド28の斜線で示した部分のノズル群N1が、下流処理を実施するノズルが位置する部分である。主走査の際には、これらのノズルが通過する部分の下方には、上流側部26fが設けられている。そして、上流側部26f上の一点線線で示す位置に印刷用紙Pの下端P'があるときに、下端部P'の印刷が行われ、その後印刷を終了する。このとき、ノズル群N1のうちの一部のノズルは、印刷用紙Pの下端（図12においては図の上側の端）よりも副走査方向上流に位置する。

【00531】上流処理の場合と同様に、副走査方向最上流のノズル（以下、このノズルを「上端ノズル」と呼ぶ。）が印刷用紙Pの下端まじりぎりの位置に位置するとき、下流のドロップの記録を行うこととすれば、理論上は、印刷用紙の下流いっぱいまで画像を記録することとができる。しかし、本実施例では、印刷用紙Pの下端が、上端ノズルよりも下流に位置するようときに、印刷用紙Pの下端部P'の印刷を実施する。よって、印刷用紙へのインク滴の着弾位置がずれた場合について、印刷用紙の下端に余白が生じない。

【00541】図13は、印刷用紙Pの下端部P'の印刷をする際の印刷ヘッド28と印刷用紙Pの関係を示す側

面図である。印刷用紙Pの下端部P'の印刷をする際、印刷用紙Pの下端P'は上流側部26f上に位置する。そして、印刷用紙Pの下端部P'の印刷は、下端部P'の真上にある#7のノズルと、印刷用紙Pの下端部P'の外側にある#8のノズルとを使用して実施する。このため、本実施例のグラフィック22は、印刷用紙Pの下端部P'に余白を作ることなく画像を印刷することができる。また、本実施例のグラフィック22は、印刷を開始する際に、フォトリソグラフィ33を使用して印刷用紙Pの位置決めを行っている。このため、印刷開始後の副走査送り方向にずれが生じ、下流処理の際に使用するノズルが正確に行われる限り、下流処理の際に使用するノズルに対して正確に印刷用紙Pを配することができる。さらに、副走査送りの駆動などにより印刷用紙の位置がずれた場合にも、#7、#8のノズルは、上流側部26f上にあるため、インク滴がグラフェン266の中央部26cに着弾することがない。

【00551】G. 変形例：なお、この発明は上記の実施例や実施形態に限られるものではなく、その要旨を逸脱しない範囲において種々の態様において実施することが可能であり、例えば次のような変形も可能である。

【00561】G1. 変形例1：上記実施例では、後知部はキャリッジ31上に一つ設けられていた。しかし、後知部は、グラフィック22の他の部位に設けることもできる。例えば、キャリッジ31が主走査において通過する空間よりもさらにグラフィックから離れた位置に、キャリッジ31とは独立に後知部を設けることとしてもよい。そのような態様とすれば、キャリッジ31を動かすことなく後出地点における印刷用紙の有無を検出することができ、そして、主走査におけるキャリッジ31の位置に付随駆動が生じた場合にも、その影響を受けない。さらに、それぞれ異なる後出地点に対応する複数の後知部を設けることができる。左側部上と右側部上にそれぞれ後知部を設けることとすれば、主走査方向のいずれの向きに印刷用紙がずれた場合にも、これを検知することができる。

【00571】また、後知部が、回転軸34上をキャリッジ31とは独立に動く態様とすることもできる。そして、印刷の際にキャリッジと後知部とが干渉しないように、後知部を移動させることとすれば、印刷の際に支障になることもない。このような態様とすれば、上述のキャリッジ31よりもさらにグラフィックから離れた位置に後知部を設ける態様と比べて、グラフィックの高さ方向の寸法を小さくすることができる。

【00581】図14は、変形例のグラフィック266の周辺を示す平面図である。後知部は、また、主走査においてキャリッジ31が往復する位置よりもさらに副走査方向の下流に設けてもよい。このような態様としても、後知部（フォトリソグラフィ33a）によって印刷媒体を送出することによって、印刷媒体を正確に位置決めしてドロップの記録を行い、記録媒体上に画像を形成することができ

る。ただし、このような態様においては、溝上に印刷用紙の上端部を配して、溝上のノズルで印刷用紙の上端まで余白を印刷を行う場合には、印刷用紙を副走査方向の上流に向けて逆方向に印刷用紙を送る必要がある。

【00591】一方、主走査においてキャリッジ31が往復する位置よりもさらに副走査方向の上流に後知部を設ける態様とすることもできる。そのような態様においては、後知部で印刷用紙を検知した後、所定量だけ副走査送りを行ってから印刷を開始することとすれば、印刷媒体の上端が任意の位置に来るように印刷用紙を配して、印刷を開始することができる。よって、印刷用紙検知後、溝上に印刷用紙の上端が来るように副走査を行って、その状態から溝上のノズルで後知部印刷を行うこともできる。このように、主走査においてキャリッジ31が往復する位置よりも副走査方向の下流又は上流に後知部を配することとすれば、単純な構造で印刷媒体の位置を検知するという目的を達成することができ、装置も小さくすることができる。

【00601】G2. 変形例2：上記実施例では、上流処理と下流処理の両方を実行していたが、必要に応じていずれか一方のみを実行するようにしてもよい。また、上流処理と下流処理の両方を実施しないこととしてもよい。本実施例の印刷装置は、グラフィック266の、副走査方向の上流部および下流側にそれぞれ上流側部26fと下流側部26fを備え、左右に左側部26aと右側部26bとを備えていたが、これらのうちいずれかを選択的に備えるものとしてもよい。そのような場合には、印刷用紙Pの各端部の印刷は、対応する端部に設けられている端部についての行われ、それぞれ端部上にあるノズルを使用して行われることが好ましい。また、端部を備えないグラフィック上において、印刷用紙Pを正確に位置決めして、両辺に余白を設けて印刷用紙P内の正確な位置に画像を印刷することとしてもよい。

【00611】G3. 変形例3：上記実施例において、ヘッドノズルによって実現されていた構成の一部をソフトウェアによって置き換えるようにしてもよく、逆に、ソフトウェアによって実現されていた構成の一部をハードウェアに置き換えるようにしてもよい。例えば、CPU41（図3）の機能の一部をハードウェア90が実行するものとする。

【00621】このような機能を実現するコンピュータプログラムは、フロッピーディスクやCD-ROM等の、コンピュータ読み取り可能な記録媒体に記録された形態で提供される。ハードウェア90は、その記録媒体からコンピュータプログラムを読み取って内部記憶装置または外部記憶装置に転送する。あるいは、通信経路を介してコンピュータプログラムを供給するようにしてもよい。コンピュータプログラムの機能を実現する時には、50

内部記憶装置に格納されたコンピュータプログラムがハードウェア90のマイクロプロセッサによって実行される。また、記録媒体に記録されたコンピュータプログラムをハードウェア90が直接実行するようにしてもよい。

【00631】この明細書において、ハードウェア90とは、ハードウェア装置とオペレーティングシステムとを含む概念であり、オペレーティングシステムの制御の下で動作するハードウェア装置を意味している。コンピュータプログラムは、このようなハードウェア90に、上述の各部の機能を実現させる。なお、上述の機能の一部は、アプリケーションプログラムでなく、オペレーティングシステムによって実現されていてもよい。

【00641】なお、この発明において、「コンピュータ読み取り可能な記録媒体」とは、レキシカルデータやCD-ROMのような携帯型の記録媒体に限らず、各種のRAMやROMのようなコンピュータ内の内部記憶装置や、ハードディスク等のコンピュータに固定されている外部記憶装置も含んでいる。

【図面の簡単な説明】

【図1】本発明の実施の形態におけるインクジェットプリンタのグラフィック周辺の構造を簡略に示す平面図。

【図2】本印刷装置のソフトウェアの構成を示すブロック図。

【図3】本印刷装置の機械部分の構成を示す図。

【図4】ピエゾ素子PEとノズルN2との構造を詳細に示した説明図。

【図5】印刷ヘッドユニット60における各色ごとのノズル群N2の配列の例を示す平面図。

【図6】フォトリソグラフィの電気的構成を示す説明図。

【図7】グラフィック266の周辺を示す平面図。

【図8】インクジェットグラフィックにおいて最初に印刷用紙Pをグラフィック266上配するときの各部の配置を示す平面図。

【図9】印刷開始時の印刷ヘッド28と印刷用紙Pの関係を示す側面図。

【図10】画像データDと印刷用紙Pとの関係を示す平面図。

【図11】印刷用紙Pの左右側端部の印刷を示す説明図。

【図12】印刷用紙Pの下端部P'の印刷をする際の上流側部26fと印刷用紙Pの関係を示す平面図。

【図13】印刷用紙Pの最下流の印刷をする際の印刷ヘッド28と印刷用紙Pの関係を示す側面図。

【図14】変形例のグラフィック266の周辺を示す平面図。

【図15】従来のグラフィックの印刷ヘッドの周辺を示す側面図。

【符号の説明】

12…スキヤ

21…CRT

面図。

図。

図。

図。

図。

図。

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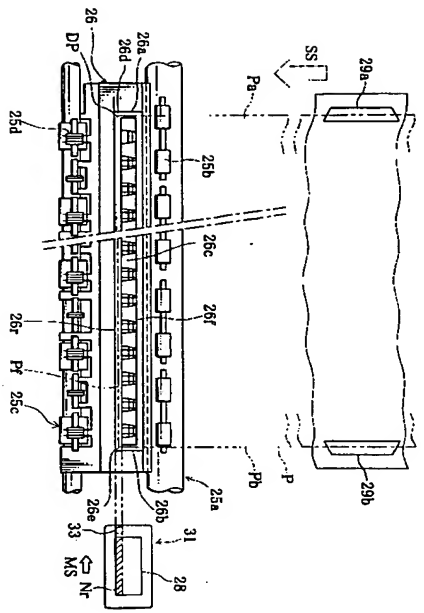
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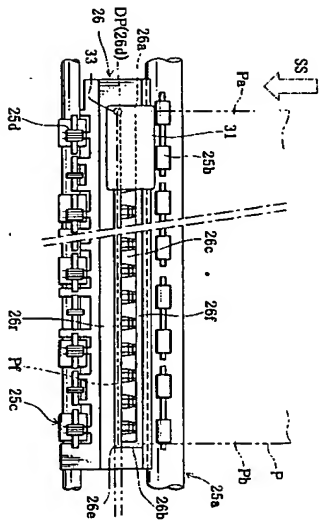
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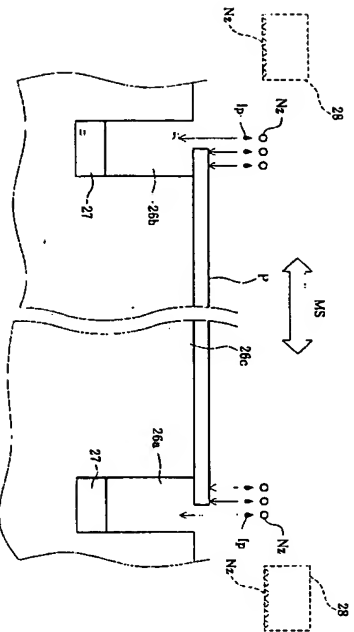
【図7】



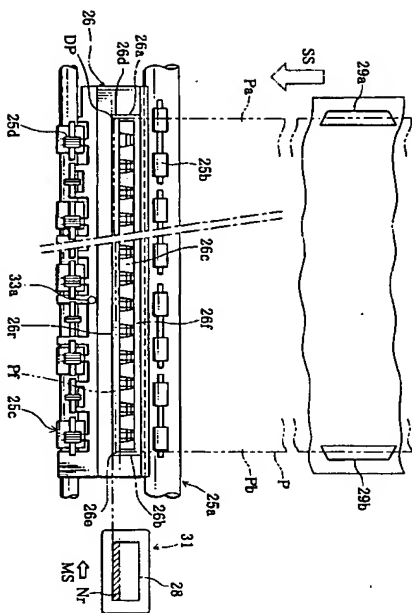
【図8】



【図11】



【図14】



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